FM front end

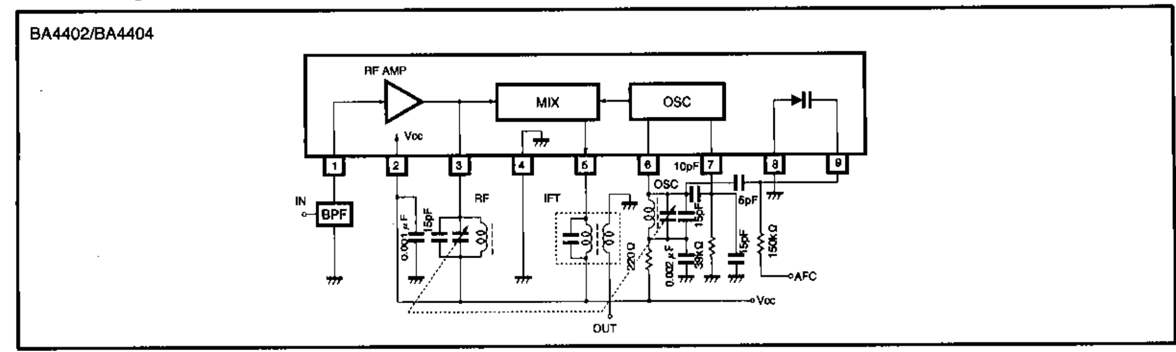
BA4402 / BA4404

The BA4402 and BA4404 are front end ICs for FM radio receivers. These devices can be used in a wide range of applications, from 3V portable radios to home stereo tuners.
The BA4402 and BA4404 consist of an RF amplifier, oscillator circuit, mixer circuit, and a variable capacitor-diode for AFC. They are pin compatible, and either can be selected depending on the amount of gain needed and other requirements of the application.

●Applications
FM pocket radios
Radio cassette players
Home stereos

●Features
1) Wide operating voltage range : 1.8 to 9V.
2) High gain with good stability.
3) An appropriate device can be selected depending on the need for AFC and the amount of gain required.

●Block diagram



Product name	Variable capacitor	Gain	RF amplifier
BA4402	Yes	32dB	Common base
BA4404	Yes	38dB	Common emitter

●Absolute maximum ratings (Ta = 25℃)

Parameter	Symbol	Limits	Unit
Supply voltage	V_{CC}	9	V
Power dissipation	Pd	1000*1	mW
Operating temperature	Topr	−25~75	℃
Storage temperature	Tstg	−55~125	℃

*1 At temperatures above Ta = 25℃, decreases 10 mW per degree.

●Electrical characteristics (unless otherwise indicated, Ta = 25℃ and V_{CC} = 3V)

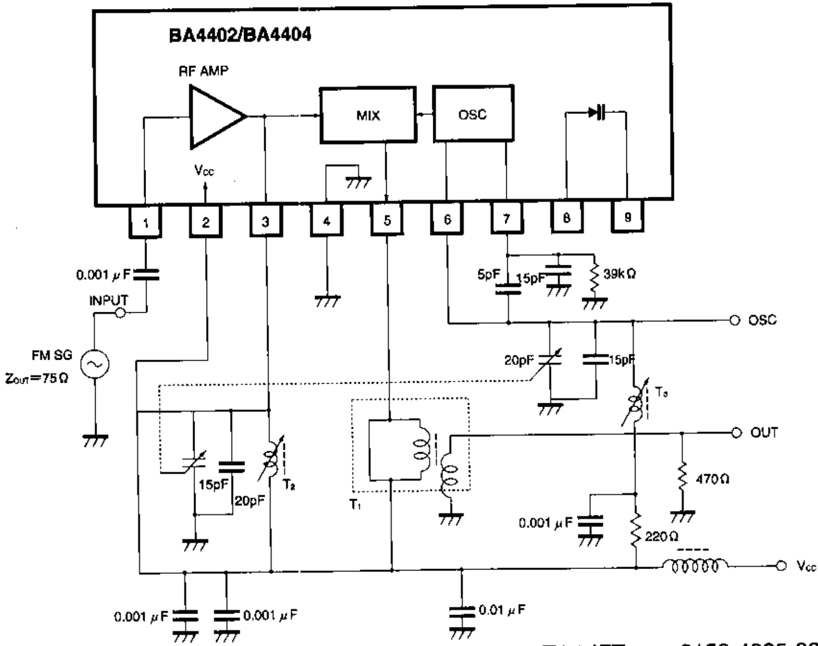
BA4402

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement Circuit
Quiescent current	I_Q	—	2.5	4.0	mA	—	Fig.1
Output voltage 1	V_{O1}	25	40	55	mV	f_{IN}=100MHz, 60dBμV	Fig.1
Output voltage 2	V_{O2}	80	120	160	mV	f_{IN}=100MHz, 100dBμV	Fig.1
Oscillator voltage	V_{OSC}	180	250	340	mV	V_{CC}=2V	Fig.1
Oscillation stop voltage	V_{STOP}	—	1.4	1.6	V	—	Fig.1

BA4404

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement Circuit
Quiescent current	I_Q	—	3.0	5.0	mA	—	Fig.1
Output voltage 1	V_{O1}	55	80	120	mV	f_{IN}=100MHz, 60dBμV	Fig.1
Output voltage 2	V_{O2}	80	120	160	mV	f_{IN}=100MHz, 100dBμV	Fig.1
Oscillator voltage	V_{OSC}	180	250	340	mV	V_{CC}=2V	Fig.1
Oscillation stop voltage	V_{STOP}	—	1.4	1.6	V	—	Fig.1

● Measurement circuit



T1 : IFT 2153-4095-322 (SUMIDA)

T2 : RF-L FEM10C-2F6 (SUMIDA)

T3 : OSC-L FEM10C-2F6 (SUMIDA)

Fig. 1

● Application example

BA4402/BA4404

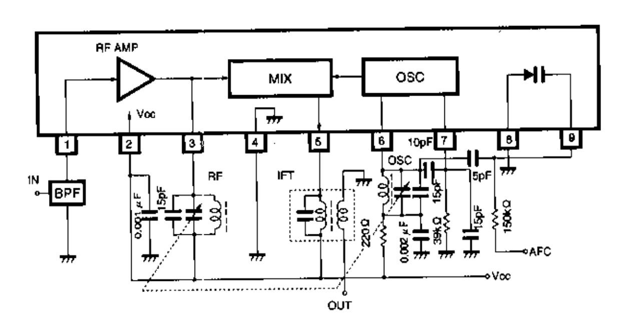


Fig. 2

●Electrical characteristic curves

BA4402

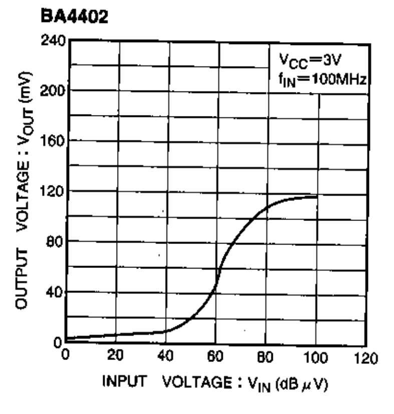


Fig. 3 Output voltage vs. input voltage

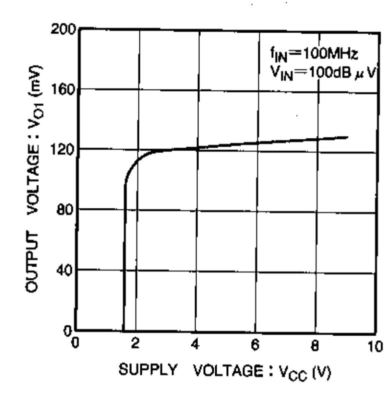


Fig. 4 Output voltage 1 vs. supply voltage

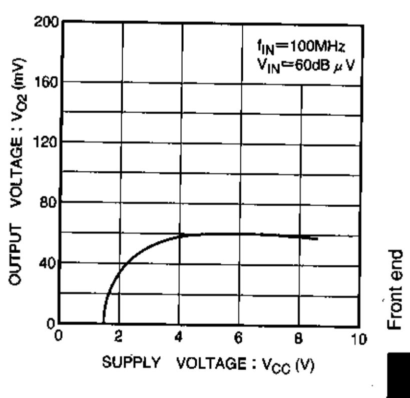


Fig. 5 Output voltage 2 vs. supply voltage

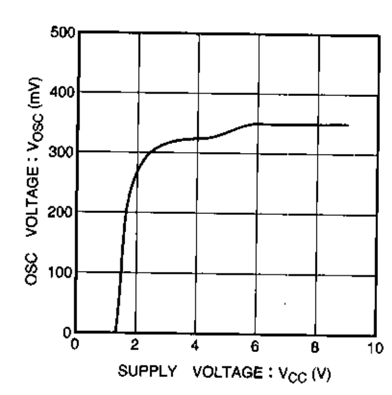


Fig. 6 Oscillator voltage vs. supply voltage

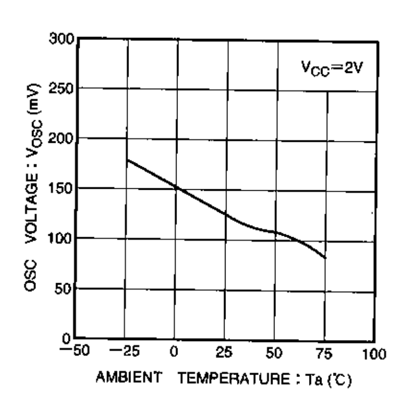


Fig. 7 Oscillator voltage vs. ambient temperature

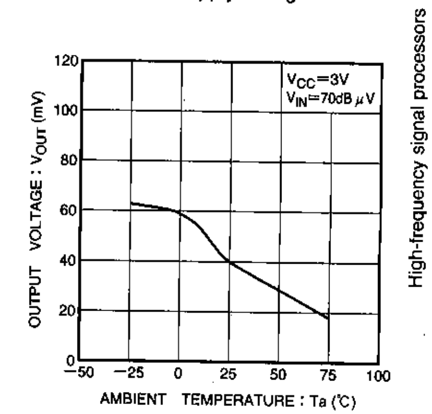


Fig. 8 Output voltage vs. ambient temperature

BA4404

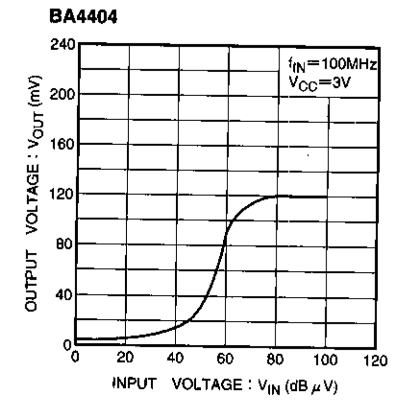


Fig. 9 Output voltage vs. input voltage

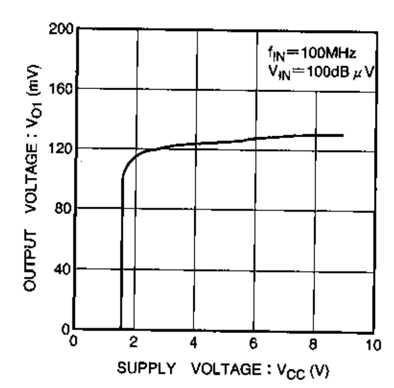


Fig. 10 Output voltage1 vs. supply voltage

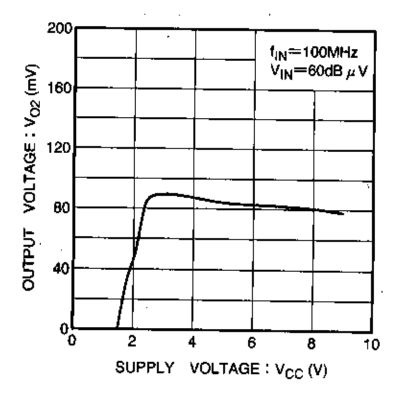


Fig. 11 Output voltage 2 vs. supply voltage

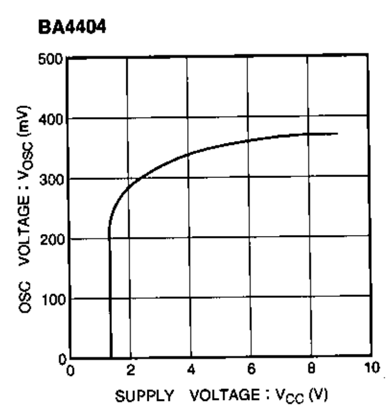


Fig. 12 Oscillator voltage vs. supply voltage

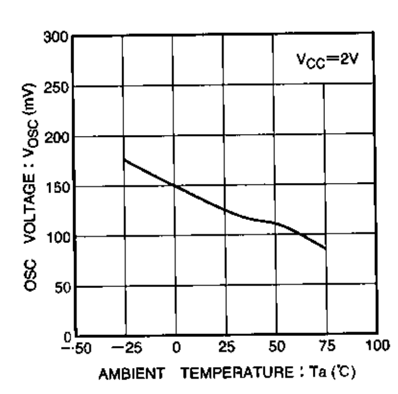


Fig. 13 Oscillator voltage vs. ambient temperature

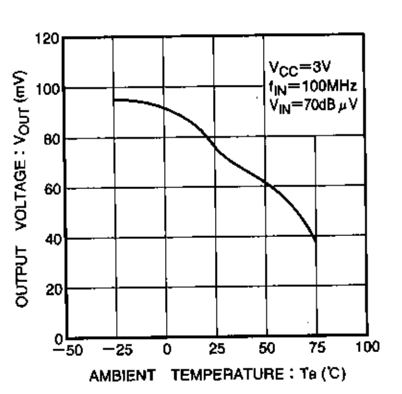


Fig. 14 Output voltage vs. ambient temperature

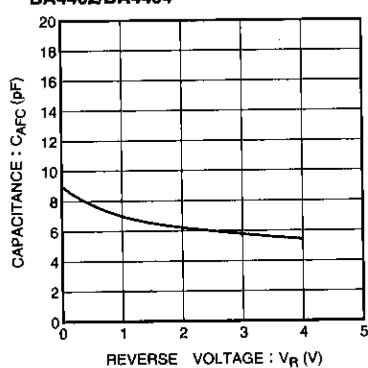


Fig. 15 AFC capacitor capacitance vs. applied voltage

●External dimensions (Unit: mm)

